# FAA AVIATION NEWS

JANUARY 1974

**COVER:**
When a "normal reserve" may not be nearly enough.
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# FAA AVIATION NEWS

**DEPARTMENT OF TRANSPORTATION**/FEDERAL AVIATION ADMINISTRATION VOL. 12, NO. 9

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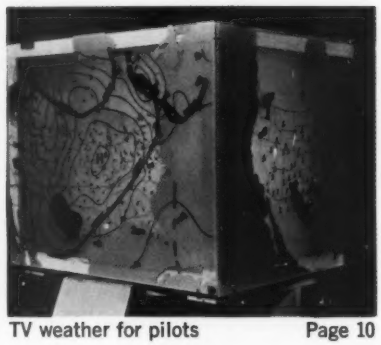

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Claude S. Brinegar, *Secretary of Transportation*
Alexander P. Butterfield, *Administrator, FAA*
Louis J. Churchville, *Asst. Administrator, Information Services*

David Gelfan, *Editor*
Gernot Rasmussen, *Art Director* Ruth Taksel Benedict, *Assistant Editor*
Louise Oertly, *Editorial Assistant*

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# Blow the Plane Down

General aviation pilots today have learned to be wary of the wake turbulence hazard from jet aircraft in the sky, but apparently there are many who still do not realize how easily those big jets can also flip you over on the ground, even when they are only idling or starting up.

A young student pilot in California learned that lesson the hard way in October of 1971. Late on that fall afternoon he had just landed his small single-engine airplane at the Van Nuys Airport. His instructor was seated beside him as he started to taxi back to the hangar. A large California Air National Guard Lockheed C-130, a four engine turboprop, was in the run-up area, its engines roaring. The young pilot taxied over onto the perimeter taxiway, which took him farther away from the airplane's blasts.

But not far enough. He was passing behind the C-130 at a distance of a little over 200 feet when the small airplane began to be buffeted severely by the turboprop blast. The instructor grabbed the controls immediately and turned the small airplane directly into the turbulence, hoping to minimize the intensity of the impact. However the blast caught the airplane under the left wing, flipped it up on its nose, and then cartwheeled it over until it landed on its back. The two men fortunately sustained only minor injuries, but substantial damage was done to the small airplane.

The investigation of the accident demonstrated that the small airplane was precisely 205 feet behind the C-130 when it was caught in the turbulence. Tests showed that at that distance behind a C-130 running at full velocity, there are gusts of wind ranging from 35 to 40 mph. The NTSB listed as the probable cause of the accident an "inadequate supervision of the flight" by the instructor who allowed his pupil to pass too closely behind a running propjet.

The danger of a ground accident from jet blast has increased several fold since the advent of the Boeing 707 in 1958. Early jet exhaust was not much stronger than the backwash of the last generation of four-engine propeller driven airplanes. Even at that, those early jet engines produced a combination of smoke and shimmering heat waves which served as a visible warning; in contrast, the exhaust of the newest bypass engines is cooler and cleaner and cannot be seen throughout much of its high velocity range. The early jets—with their screaming engines and highly visible exhaust—made people give them a lot of room around airports. It is ironical that even though today's jets are cleaner and quieter they have a bigger exhaust kick and are therefore even more hazardous for the small airplane near them.

The original Boeing 707 of 1958 was powered by a Pratt-Whitney JT3C-6 engine which had 13,000 pounds of thrust at takeoff power. Today's 747 with its four JT9D series engines generates a takeoff thrust of about 180,000 pounds. In fact, the 747's takeoff thrust is roughly equivalent to the thrust of the Delta rocket which is used to launch communications satellites into outer space. No one would think of launching a Delta rocket from a busy airport; yet the same amount of thrust is expended daily at airports around the country—and with even greater diffusion than the Delta rocket, because the rocket thrust is directed downward, while the 747's blast is directed horizontally.

In still air conditions a jet's wake can create a hazard over the runway for small aircraft for as long as two minutes. Thanks to pilot education and controller precaution general aviation flyers are becoming alert to the dangers from wake turbulence in flight. But in recent years at least half a dozen general aviation pilots have had their airplanes flipped over when they got too close behind a large jet that was taxiing or "breaking-away."

Breakaway blast from a large jet results from the thrust which must be applied to get as much as almost 800,000 pounds of airplane moving from a standing position, as in the case of the 747. Once the jet starts to roll, the thrust required to keep it moving is considerably less, but it is still a potent force. Unfortunately, the big jets often have to use breakaway power in the most congested parts of the airport—in the apron and maintenance areas, and in the takeoff area.

Of course, it would be very foolish to get that close to a big jet when it is taking off. But now consider the wind velocity created at idle and breakaway. An idling three-engine wide body jet will create an exhaust velocity of 75 mph at a distance of 50 feet behind the tail. At the same distance at breakaway the wind velocity increases to 200 mph. And even if you are 200 feet behind a three engine wide body at breakaway the wind velocity is 75 mph.

Consider what these figures mean in actual wind velocities to the pilot who is sitting behind one of those large jets in his small private airplane. Wind velocities of 80 mph constitute actual hurricane force. Any area which had early warning of approaching 80 mph winds would be issued a hurricane alert. People would evacuate homes, fly out airplanes, and close airport operations. You would expect trees to be uprooted, windows smashed, vehicles flung about savagely. Think about this if you happen to be sitting in a small airplane, say, 110 feet behind a four engine wide body jet starting to breakaway. You are virtually sitting in the path of a hurricane.

This is what happened to an instructor pilot not long ago at Nashville Metro Airport in Tennessee. It was three o'clock in the afternoon on a February day in 1972 when the instructor, a very capable young lady, was taking a pupil out for dual training. It was a busy afternoon at Nashville, and there was heavy traffic on the runway. The instructor was given clearance to roll out to the runup pad, a large semi-circular surface. But it was crowded out there, and three airplanes were ahead of her: a 727, a DC-9, and a Beech *Debonair*. They were all momentarily halted while waiting for an *Aero Commander* to land.

The instructor manuevered her small air-

# Blow the Plane Down

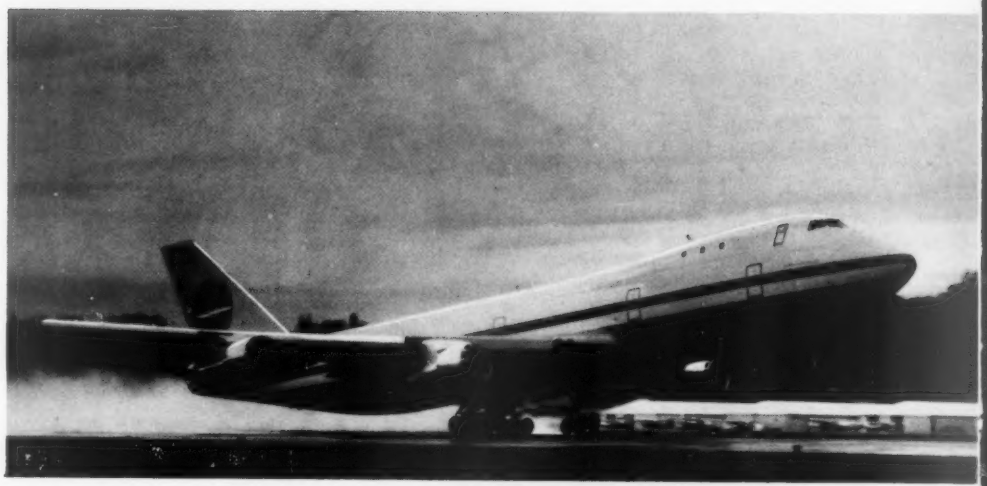
plane into the crowded ramp area, attempting to take her place as fourth in line behind the Beech. She was still on ground control frequency, but the other three airplanes had switched to tower frequency and she could not hear what they were saying. Attempting to get behind the Beech on the semi-circular ramp, she crossed directly behind the idling DC-9. Unknown to the instructor the DC-9 had just been cleared to takeoff, and the pilot applied breakaway power to move out on the runway. At that instant the small airplane was 120 feet behind the DC-9, and it was blown sideways. The instructor turned sharply, attempting to roll out of the jet blast range, but it was too late. The small airplane was picked up and flipped over. Neither the instructor nor her passenger was seriously injured, but the airplane was substantially damaged.

Every general aviation pilot who uses an airport which serves large jets should be aware of the potential safety hazard from those jet blast hurricanes. The danger area, of course, is to the rear of the jet engines, and private pilots should acquaint themselves with the blast forces in terms of distance behind a jet. If you are 50 feet behind an idling three engine wide body jet, for instance, you are in a jet hurricane of 75 mph; but if you are 200 feet behind it when it applies breakaway power you are also in a 75 mph hurricane. It might be well to clip out the illustration which accompanies this article and keep it in your log book for reference.

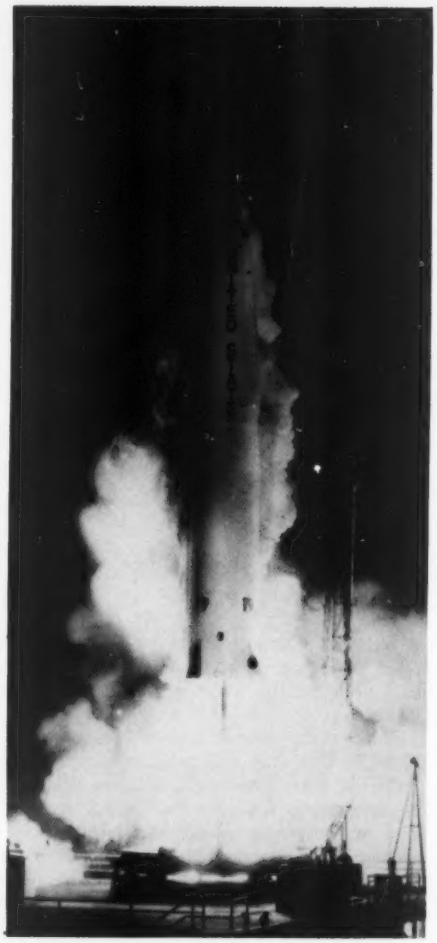
Whenever you are taxiing at an airport—before takeoff, or after landing—and you see a large jet you must pass behind, use extreme caution. You want to give yourself sufficient distance to stay out of that hurricane range—and you also want to stay out of the range of blasts of lesser intensity which could toss around a light airplane. The 35 mph exhaust velocity, for example, which follows 475 feet behind a four engine jet which is breaking-away could very well flip over a small light airplane. If you are in doubt, stop and ask ground control for assistance.

In these days of clean exhaust, it is a mistake to assume that any air carrier jet standing at a gate has shut down its engines; or even to pass behind an apparently idling jet without knowing what its intentions are. In most cases, certainly, ground control will not guide you into situations which could be hazardous, but you must realize that ground control cannot always see every aircraft on the ground, or be responsible for unexpected behavior on the part of other pilots. When in doubt, interrogate!

For your own safety you should realize that if you are in a line of aircraft waiting to takeoff, and that lineup includes some large aircraft which have come to a halt, there is going to be quite a blast behind them when they have to start moving again. Make sure that you are not in the line of fire, even if that means requesting approval to move out of lineup. Ground control is primarily concerned with directing traffic so as to prevent collisions and expedite the flow of aircraft in and out of an airport. Other aspects of ground safety remain the responsibility of the pilot.



The takeoff thrust of a Boeing 747 (above) is about like that of a Delta rocket, which launches communications satellites into space.



The record books are filled with reports of small plane pilots who were flipped over at airports because they assumed that the tower had taken care of their safety problems. A typical example is the 24-year-old, instrument rated pilot who had just flown a single-engine aircraft from Akron to Cleveland's Hopkins Field. En route to the hangar area he was advised by ground control to hold his position on the taxiway and allow a landing B-727 to pass by before crossing the runway.

The B-727 landed and passed in front of the small plane, but was obliged to come to a halt on the runway before turning off because of a traffic problem ahead. In the meantime, the private pilot was cleared to cross the runway. As he was taxiing across, the traffic jam ahead of the B-727 cleared up and the jet revved up its engines to move on. The breakaway jet blast caught the small airplane, picked it up, and set it down on its nose. Substantial damage.

It is the unexpected event on the airport that frequently throws the pilot on his own resources. Like the gusty, windy day at Orange County Airport in Santa Ana when a light twin tipped a wing on landing, but managed to taxi off the runway.

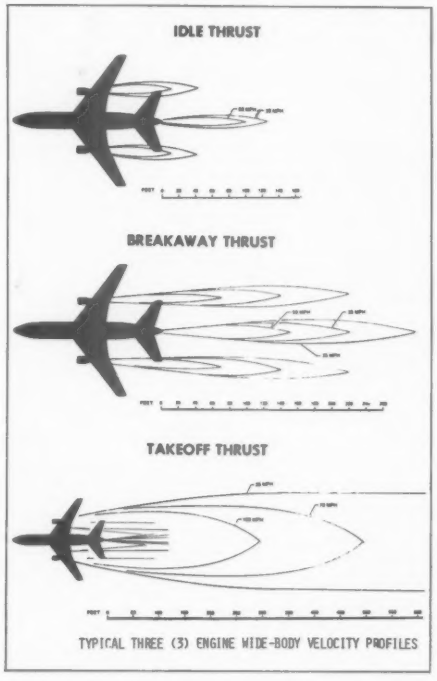
A second airplane, a single engine trainer, made it down smoothly enough but had difficulty trying to get around the first plane, which stopped for inspection of damage.

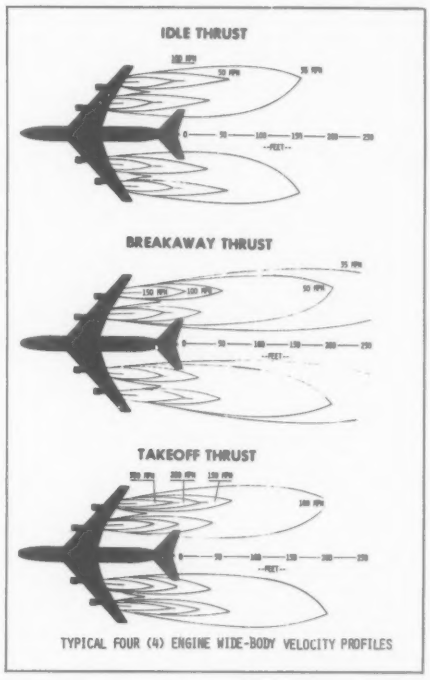
Unfortunately, the spot at which the trainer had stopped was about 200 feet directly behind a Boeing 737 out on the runway, which was idling while waiting for takeoff clearance. Seconds after the small airplane stopped the B-737 got its clearance, added power, and began to turn to the right. The blast caught the small air-

plane 200 feet behind it and tossed it over on its back. Again, very substantial damage. The pilot was undoubtedly the victim of unfortunate circumstances, because if the taxi aisle had not been blocked he would have been well into the tie-down area before the 737 applied breakaway power. But this is why a pilot who finds himself in a confused situation on the runway or taxiway should look around to see where he is and then call the tower for assistance if necessary. Remember that the pilots of the big jets are unable to see what is taking place directly behind them.

Strong winds, such as these mentioned in the Santa Ana accident, are another factor which a pilot should consider when he is estimating exhaust velocities from those large jets. Crosswinds can move that jet blast from a position directly behind the airplane, where it might be anitcipated, a considerable distance to the right or left of the airplane. A crosswind of 45 mph can displace the idling exhaust zone of a jet sideways as much as 175 feet. At breakaway, that exhaust zone may move anywhere up to 225 feet to one side of the jet. At takeoff in a 35 mph crosswind the exhaust zone may shift as much as 775 feet on either side.

In addition to the danger of being flipped over by a large jet, there is another safety hazard involved in getting too near the big birds: structural damage to a small airplane. Not much study has been done on this question yet, but there is an increasing suspicion that close exposure to jet blast can injure your airplane, even if it doesn't flip it over. Those high velocity winds which the jets throw back can blow rocks or debris against a small airplane, which may lodge in a control surface or jam cables or other equipment. Or, high intensity winds could bend ailerons or rudders out of alignment. The tragic aspect of such damage is that the pilot who is waiting to takeoff may not realize that his airplane has been damaged until he is airborne and it is too late.




Turbulence velocities change dramatically between idle, breakaway and takeoff power.

## THREE ENGINE Wide Body Jet

| POWER | DISTANCE BEHIND TAIL | EXHAUST VELOCITIES |
|---|---|---|
| IDLE | 50 FT | 75 MPH |
| IDLE | 100 FT | 45 MPH |
| BREAKAWAY | 50 FT | 200 MPH |
| BREAKAWAY | 200 FT | 75 MPH |
| BREAKAWAY | 350 FT | 45 MPH |
| TAKEOFF | 150 FT | 200 MPH |
| TAKEOFF | 225 FT | 150 MPH |
| TAKEOFF | 350 FT | 100 MPH |
| TAKEOFF | 500 FT | 75 MPH |
| TAKEOFF | 630 FT | 60 MPH |
| TAKEOFF | 860 FT | 45 MPH |
| TAKEOFF | 1100 FT | 35 MPH |

## FOUR ENGINE Wide Body Jet

| POWER | DISTANCE BEHIND TAIL | EXHAUST VELOCITIES |
|---|---|---|
| IDLE | 25 FT | 50 MPH |
| IDLE | 200 FT | 35 MPH |
| BREAKAWAY | 110 FT | 80 MPH |
| BREAKAWAY | 200 FT | 65 MPH |
| BREAKAWAY | 475 FT | 35 MPH |
| TAKEOFF | 100 FT | 150 MPH |
| TAKEOFF | 275 FT | 100 MPH |
| TAKEOFF | 425 FT | 80 MPH |
| TAKEOFF | 700 FT | 65 MPH |
| TAKEOFF | 1600 FT | 50 MPH |

### Invisible Enemy

An NTSB study entitled "Jet Blast Hazards," cites one such accident which was attributable to jet blast damage which was unrecognized at the time it occurred. A twin-engine commuter airplane crashed during takeoff when it drifted to the right of the runway and lost all elevator control. There were no fatalities, but the examination of the wrecked airplane disclosed that the elevator push-rod assembly had mysteriously separated—the rod and adapter had pulled out of the tube assembly at the magneform joint.

Further investigation revealed that just before the accident occurred the airplane had been parked for more than an hour in a general aviation parking area, and the airplane's tail had been positioned toward the airline terminal gates where large jets had been operating. The investigators were able to determine that one large jet transport departed from the terminal gate and was directed to make a left turn which headed its tail directly toward the tail of the smaller airplane. The probable cause of the accident was attributed to both jet blast from the jet transport and inadequate preflight inspection.

The large wide body jets are an important part of the growing age of aviation, which general aviation can learn to live with if he understands the potential hazards of ground turbulence and protects himself. Don't get flipped. ■

# False Security Blanket

It is freezing weather outside, and snow is falling as you make preparations to take off. Your airplane has been parked outside for some time, or perhaps overnight, and that means you will have to make sure that all surfaces are clean and smooth before you move, and sprayed with anti-icing fluid. Right?

Right as rain (or snow, in this case) because if you take off with even a thin layer of ice or frost on the wing the laminar flow of air is disturbed, causing higher stall speeds and reduced lift, which might only become apparent to you after you rise above ground effect—if you ever get any higher.

But supposing you had your airplane in a heated hangar overnight, and you plan to roll it out and take off as soon as possible. No need to worry then about an anti-ice spray, is there? You will be taking off in a few minutes and you expect to fly way above the weather.

Unfortunately, that is a misconception that has led to fatal consequences. Indeed, that heated hangar could be a false security blanket for you.

When falling snow settles on hangar-warmed aircraft surfaces, it is apt to melt. Some of the liquid will drain off, but as soon as the metal skin's temperature drops down to the ambient freezing level, ice will form. Falling snow will stick to icy-wet wings like glue.

While waiting for takeoff clearance the pilot may look out and see the new snow on his previously clean wings, and conclude that it will blow off during takeoff. This assumption, usually triggered by "get-there-itis," ignores the facts, often with tragic results. If the snow build-up formed while snow-melt was refreezing, a hurricane will not remove it. Even if there is no precipitation, a plane which must fly through a layer of air having high humidity and freezing temperatures on climbout is a prime target for instant, all-over frosting.

Rolling a plane out of a hangar in snowy weather would not be so hazardous if the pilot had a guarantee that he could take off immediately. But there is no such guarantee, particularly at busy airports. You may have to wait for taxi clearance, and then for takeoff clearance. This might take as much as a half hour, and maybe even longer in IFR weather. And all the while you are sitting there, waiting, a nearly invisible layer of frost may be forming on your wings—especially if the temperature outside drops down to the dew point.

Recently an FAA General Aviation Maintenance Inspector, Wilfred C. Tetrault, of the Rochester, New York, FSDO, analyzed three fatal winter takeoff accidents in his area and noted a number of strikingly similar circumstances leading up to each crash:

- Each involved an airplane that had been parked overnight in a heated hangar.
- Each aircraft was rolled out in snowing conditions with the temperature at or near freezing.
- Anti-icing fluid had not been used on any of the aircraft.
- Each aircraft took off within 30 to 55 minutes after being rolled out of the hangar.
- All three crashed within seconds after takeoff.

One of the accidents took place at Skaneateles, New York, on April 6, 1972. Early in the afternoon of that snowy day, a twin-engine Beech E18S was rolled out on a private landing strip next to Lake Skaneateles. It was a corporate airplane, scheduled to fly five executives of a construction company to Harrisburg, Pa. It was snowing, and the temperature was 25° F., the dew point 21°.

The pilot was a 53 year old veteran flyer from World War II days, but when he rolled his airplane out, just before noon, he failed to take the precaution of having anti-ice spray applied to his wings. At 1:41 p.m., the airplane sped down the runway for takeoff and lifted off, but rose only to an altitude of 100 feet before it yawed to the right, lost altitude and fell toward the lake. The Beech first hit a tree near the lake's edge, then shot out over the water. It touched down on a frozen section of the lake, and the right main landing gear broke through the ice. The airplane pivoted sharply and skipped off the ice shelf into freezing water. It began to sink.

Three of the passengers managed to scramble out of the main entrance door as the airplane was sinking, but the pilot and two other passengers trapped inside went down with the airplane. Several men who were working at a country club on the shore immediately got two eight-foot dinghys out of a shed. They chopped through shore ice, rowed out to the site of the accident within a few minutes and were able to rescue the three men who were swimming in the water. An exceptionally fast fire department rescue truck arrived at the lake's edge a few minutes later, and within 15 minutes from the time of the crash, fire department divers had descended to the sunken airplane. By that time the three men inside were, of course, dead.

The subsequent NTSB report stated that there was inadequate preflight preparation and that the pilot ". . . failed to use anti-icing/de-icing equipment."

The second accident involved a scheduled air taxi Beech C45H flying out of Broome County Airport in Binghamton, N.Y., on March 22, 1970. The same conditions prevailed here—with two interesting exceptions: the airplane was out in the snow only 31 minutes from rollout from the hangar to takeoff, and the *temperature was above the freezing mark* when the airplane left the hangar.

The Beech was scheduled to carry nine passengers to Washington, D.C., that snowy afternoon. When the airplane came out of the heated hangar at 3:40 p.m. the temperature was 35° F., the dew point 33° F. The falling snow was described as "moderate". The pilot, a seasoned ATR flyer with more than 6,000 hours logged, decided that anti-icing spray was unnecessary. After all, the

temperature was above freezing.

It was a fatal mistake. The given airport temperature may be different in various parts of the airport, due to obstructions, uneven terrain, and blowing winds: it may well be above freezing at one point and below freezing at another. That is what apparently happened at Broome County Airport. The NTSB report later stated:

*"Although recorded temperature during the period was 35° F., the ambient temperature in the vicinity of the aircraft, after removal from the heated hangar, could have been substantially less, i.e., below 32° F. The aircraft was exposed to this temperature for approximately 31 minutes, during which time a moderate snowfall was reported. It is conceivable that, initially, the relatively warm metal of the airframe would cause the snow to melt upon contact, thus forming a liquid film on the aerodynamic surfaces. This film would then freeze as the surface temperature stabilizes at the ambient temperature below 32° F., thus providing a surface to which snow would adhere."*

At 4:05 p.m., the Beech was given clearance to taxi to the runup area, and six minutes later was given takeoff clearance. The co-pilot later recalled that a thin layer of snow began to accumulate on the upper surfaces of the wings during the boarding procedure, but he was not concerned since he assumed the snow would blow off the surfaces during taxi or takeoff. Another survivor of the accident, a "deadheading" pilot on board, recalled that during the takeoff run *some* patches of snow did blow off, but that the major portions of the wing remained covered with snow.

Shortly after liftoff, at an altitude of about 75 to 100 feet, the Beech's left wing dropped sharply. The pilot was able to raise the wing with aileron control, but the airplane mushed back and forth before leveling off at approximately 20 feet above the runway. The pilot then retracted the landing gear and the Beech began to climb, but at an altitude of about 75 to 100 feet the left wing again dropped sharply. About 20 feet above the runway, the pilot cut power and made a smooth wheels-up landing. However, the airplane slid the entire length of the mushy runway, went over an embankment, and crashed into an electrical transformer unit which served the ILS approach lights. Fire broke out after impact, but the co-pilot and seven passengers were able to crawl out. The pilot and two passengers were killed.

The NTSB report stated that the probable cause was the pilot's attempt "to take off with snow adhering to the airfoil surfaces," which caused "a degradation of aircraft performance and the loss of control following lift-off." The report noted that the pilot did not use anti-icing spray, although it was available in the hangar: ". . . it is obvious that under the circumstances the aircraft should have been de-iced prior to takeoff"

The third episode in this trilogy of frosted wing accidents happened at Buffalo Airport on Saturday, December 16, 1972. This one involved two scientists from Allentown, Pa., who had hired an airplane and pilot for a business trip to Buffalo. The pilot was 31 years old, instrument rated, with over 1,000 hours logged, and he flew the two passengers to Buffalo in a Cessna 421. They arrived on Thursday, the 14th, when the two men delivered a business presentation in the city about an anti-pollution device they were sponsoring.

They planned to leave the following day, but on that Friday a severe snow storm hit the area and the flight was cancelled. On Saturday morning the temperature was still below freezing but the snow had diminished to a light fall. The pilot decided it was all right to take off. Employees at the airport that day later recalled that the two scientists expressed some concern about the flying conditions but the pilot assured them they could quickly get above the weather.

The pilot had the Cessna rolled out of the hangar—without application of any anti-icing fluid. At that moment the temperature was 22° F., the dew point 20° F., and it was still snowing. Visibility was ¾ of a mile, with a ceiling of 1,000 feet overcast. The pilot climbed in the cockpit and warmed the engines for about 15 minutes. At 10:16 a.m. he contacted the tower for ATC clearance and he was cleared to taxi to runway 23. There was a base of hard packed snow on the taxiway, and he had to proceed slowly and cautiously. He maneuvered along the taxiway, had to cross another runway and arrived at the runup area of runway 23 at 10:32. Four minutes later he received his takeoff clearance. When the Cessna started its roll it had only been out of the heated hangar for 30 minutes.

The aircraft lifted off, slid into a shallow left turn trying to climb, and never rose any higher than 200 feet. The pilot got his gear and flaps up, and he fought the controls for altitude. The airplane wobbled from side to side, then the left wing went up, and the nose; it almost appeared as if the airplane were standing on its tail. Then it dipped, and began losing altitude.

In its descent, the airplane first hit a power line, breaking open fuel lines and exploding into flames in the air. Then it slammed against a small home, spewing gasoline and fire. Next, it ricocheted across the street where it hit another occupied house and embedded itself.

In those few seconds six people died. The pilot and the two scientists were killed on impact. In the first household a mother and her two children were killed from the crash and the ensuing fire. Her husband jumped out of the upstairs window, his clothes on fire, but he was able to extinguish them by rolling in the snow. A woman inside the second house received serious, though non-fatal, injuries.

There is an ironic footnote to the horrible tragedy at Buffalo. A few minutes later a similar light twin which had also been hangared overnight departed the same airport, climbed out and completed its flight without incident. Significantly, the pilot had taken the precaution of spraying the wings and tail with anti-icing fluid.

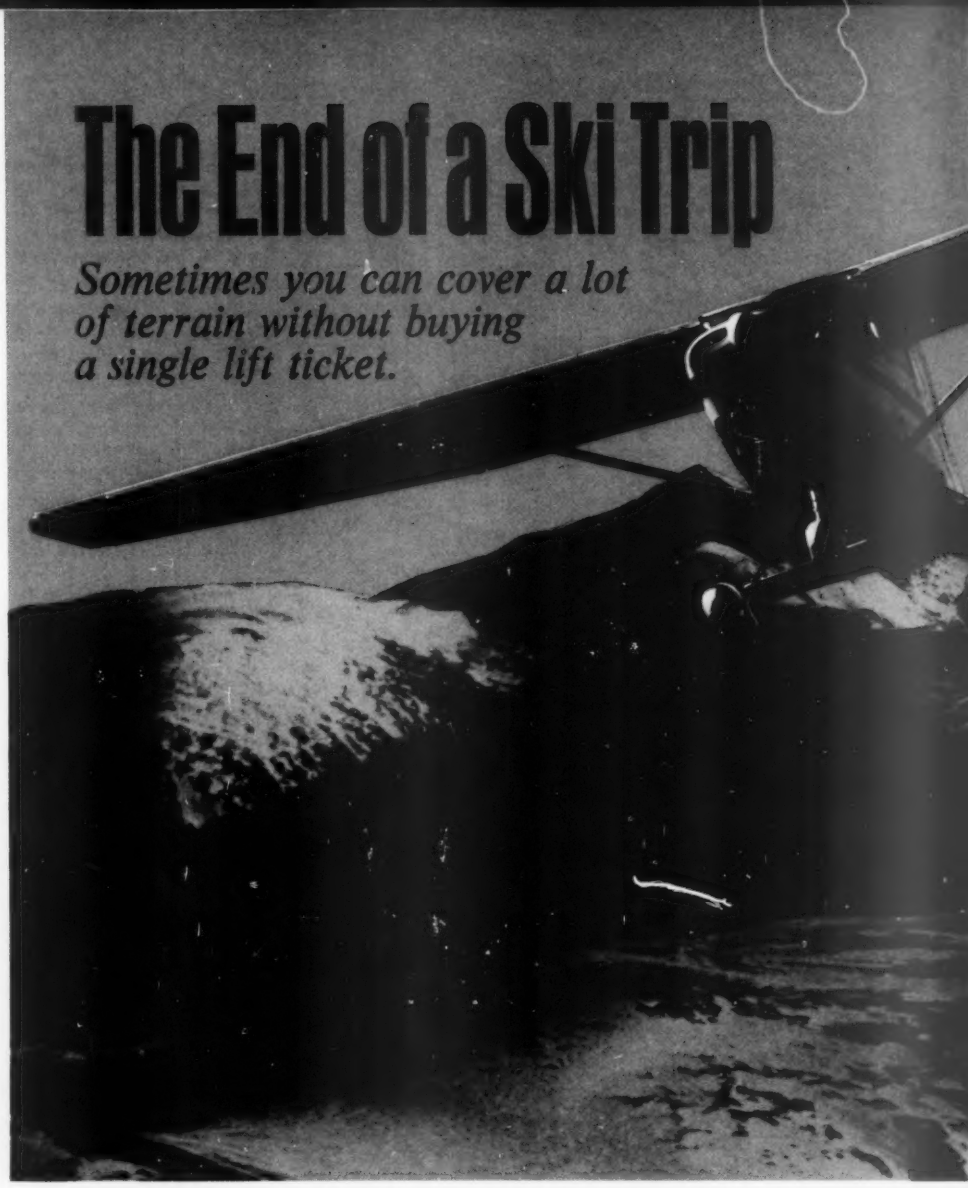
The advantages of parking an aircraft overnight in a hangar during bad weather are obvious, but the protection it affords should not lull you into a false sense of security when it comes time to depart. A heated airplane is easy to start and comfortable to sit in, but snow will coat it with a "quick-freeze" liquid that spells trouble—unless you use anti-icing spray. Incidentally, glycol or isopropyl alcohol used for this purpose may soon be in short supply.

The only really safe security blanket is the intelligence to know when it is not safe to go. ■

Fatal plunge into Lake Skaneateles in snowstorm inflicted only slight damage to the aircraft.

# The End of a Ski Trip

*Sometimes you can cover a lot of terrain without buying a single lift ticket.*



You had really planned this trip down to the last detail. In fact, in the year since you had learned to fly and bought into the Flying Club at Garden City, Kansas, you and your skiing pal had done practically nothing else in your spare time. As the takeoff morning approached, your folder marked "Ski Trip" was bulging, and you were familiar with every inch of the terrain along the way. You had made certain that fuel would be available for you at Alpine Valley in the gloriously snowy Rockies. And to keep the little 172 light enough to manage the high passes near your destination, you had kept baggage to a minimum. The oxygen bottle was fastened in place. Full fuel tanks gave you three hours en route (about 350 miles) plus nearly two hours reserve, a good conservative situation—you thought.

Came the great day of departure and you had set off after filing a flight plan with Garden City FSS, and getting your weather briefing, which called for clear skies all the way and rough air in the passes. There had been an overnight snowfall at Alpine, but the airport plow had gone into action at dawn, and the runway was expected to be cleared by 9 a.m. Your ETA was 11 a.m., so you had a comfortable cushion there.

You had flown the airway as far as Pueblo, and then followed the railroad and river up to Twin Lakes, where you turned west. Independence Pass (12,093 feet) put a little strain on the engine and your nerves (service ceiling of the 172: 13,000 feet), and the turbulence was there all right, but manageable, and soon you were sailing "downhill" toward Alpine Valley and the beautiful snow country.

What was not so beautiful was the sight of a half-plowed runway and a big fat snowplow truck sitting motionless on the snow. By way of UNICOM you learned that the runway clearing operation had been interrupted because of a broken plow blade. A replacement was expected to arrive momentarily from Glenwood Springs, but even then it would be about an hour before anyone could expect to land on the runway. *They were very sorry; could they help in any way?*

A glance at your panel clock told you not to stick around and wait: you were 45 minutes behind schedule. The headwinds in the passes had caused you to use up all but about an hour of fuel. Where to go?

Your efforts to contact Eagle FSS some 50 miles to the north were unsuccessful, so you got back to Alpine UNICOM. They checked the nearby airports over the phone and reported back the bad news. To the west there was still weather, and none of the airports within 70 miles were open. They suggested Leadville, 30 miles to the east.

Leadville's two-mile high airport soon showed up under your starboard wing, with a glistening, unbroken expanse of fresh snow on the runway—the plow was not operating because of a shortage of diesel fuel. No problem if you are ski-equipped for landing; otherwise, sorry, you had better head for Denver.

You had burned off another couple of minutes of precious fuel while your companion hastily worked out a navigable route to Denver, via Dillon and Loveland Pass—a total distance, he estimated, of 90 miles. *Did you have enough fuel remaining?* It all depended on the tailwinds in the passes.

But all passes in the Rockies do not have tailwinds—even if you are headed in an easterly direction—as you soon discovered, watching the minutes tick away as the mountainous terrain slid slowly past.

You were just over the west edge of Denver, with the airport in sight at the far end of the city, when the engine began to sputter. Reluctantly you declared an emergency and listened, damp with embarrassment and anxiety, as the tower gave you clearance to land on any runway you could make, and held the other traffic off. You almost made the pavement, but dropped short on the slushy overrun, lost control and wound up with a three-point landing utilizing the propeller, wingtip and one wheel. All you could think of, as rescue equipment sped to your undesired assistance, was "I had nearly two hours of reserve!"

Obviously it was not enough.

Some pilots, unfortunately, learn the hard way that VFR flying in mountainous snow country like the Rockies calls for a different kind of fuel management and planning than what they may be used to over flatland. They also learn the difference between a runway that is "expected" or "scheduled" to be cleared of snow or other obstacles to landing, and one that is actually in operation. In midwinter that difference could amount to hours, or even days. No one is going to deceive you intentionally, but in the name of reason and safety you should check by radio or phone before you commit

yourself to what could be a point of no return.

In the mountains, a "normal" reserve may not be nearly enough. Many veteran ski-flight pilots feel that a 50% reserve is not too much; in other words you should have enough fuel to get back where you started if you need to, or at least to a *good* alternate, one that is *certain* to be cleared quickly after a snow. They know that when you choose an alternate you have to consider the flying conditions involved in getting there, especially the minimum altitudes en route and ease of reception of radio and navaid signals, to say nothing of the weather. The best airport in the world is of little use if you have to cross 14,000 feet terrain to get there and your plane will only go to 13,000. You have no oxygen?—forget it.

There are any number of reasons why you may need an alternate landing or refueling spot when you are flying in snowy mountains. For one thing, a snow or ice storm may blanket a wide area, closing up airports as it goes. On the other hand, even if weather in the area appears to be generally clear a spot snow shower could shut down your particular destination airport. Predicting snow patterns in the mountains is difficult even for those familiar with the country; for the newcomer it is next to impossible.

Remember that fuel supplies at airports depend on truck delivery, and if the roads in the area are closed by snow the fuel trucks may not get in. This is separate and aside from other fuel shortages—spot or general—that may result from the present energy crisis.

Because airports in ski resort areas afford important transportation, every effort is made to clear the runways as rapidly as possible after a snow, and in the majority of cases they are successful. Nevertheless, you must always consider that delays *can* occur, because of personnel shortages or equipment malfunctions—or unscheduled precipitation. Occasionally an airport will be closed because the only runway is blocked with a disabled aircraft which failed to make a successful landing or takeoff. Its removal may take more time than you can risk.

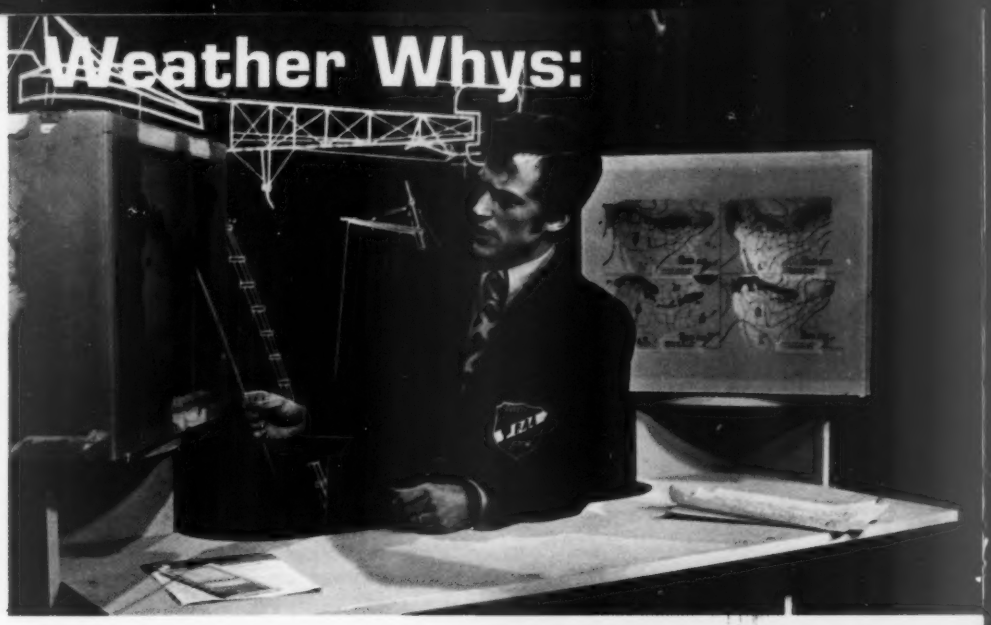
In addition to fuel management and the wise choice of an alternate airport, there are numerous other safety aspects of flying into a ski resort. Pilots unaccustomed to flying over mountainous terrain are urged to plan an enroute stop at one of the foothill airports prior to entering the mountains, and consult with an accident prevention counselor or a local pilot before flying on. It helps immeasureably to get advice on things like routing and altitudes, and to learn what assistance is available for flight planning, weather information, etc. For example, if you are hopping off from Denver, the local FSS records separate weather information for each of the routes out of the city with a separate phone number for each (listed in Airman's Information Manual, Part 2). You can phone the number for your planned route and get specific and detailed information for that area. The FSS specialists near the mountains are well qualified to assist you with your planning.

Be sure to check the weather and winds over your entire route. Winds in the mountains can be far more dangerous than in level country and sometimes an aircraft simply cannot outclimb them. When pilot balloon observations (PIBALS) in the foothill ridges show winds 35 to 40 mph you can expect 80 to 100 mph westerly winds over the ridges. In canyons and passes a venturi effect may accelerate the velocity of the winds to about the same degree.

Because wind velocity (and direction) in the mountains is always in part an unknown quantity, intelligent fuel management calls for a reserve that cannot be reduced to a formula, but which should be appropriate to the conditions of your flight. Calculate what you will need if everything goes against you, and then you will be able to enjoy your ski flight in the air as well as on the snow. ■

Flying into a ski resort is the quickest, most comfortable way to get there, but before he goes the pilot should be well informed about the airport. A slight slope to the runway, for instance, can shorten its effective length or create unorthodox traffic patterns.

# Weather Whys:



Above—On the specially designed "Aviation Weather" set at the Maryland Center for Public Broadcasting, Jan Allsman points out the color-coded areas of fair, marginal and IFR weather. Right—Allsman supervises artists as they draw in weather on the maps.

# AT LAST! Weather in Living Color

Although Jan Allsman has been giving weather briefings to pilots for more than six years in his capacity as specialist at FAA's Washington, D.C. flight service station, he almost certainly set a record on January 4th for the number of pilots to be briefed in one session. This was the evening that "Aviation Weather" went on nationwide television. When Allsman aimed his pointer in the direction of the map to discuss the weather on this particular Friday evening, his words went out coast to coast over more than 100 stations of the Public Broadcasting Service (PBS) television network.

In living rooms across the nation pilots sat with notepads resting on the arms of their favorite easy chairs, absorbing detailed information on what kind of flying conditions they could expect over the approaching weekend. Actually, pilots in the eastern part of the country have been enjoying weather briefing via TV for more than a year, but this was the first time that it was broadcast on the nationwide network.

Aviation weather in living color on television first went on the air in June, 1972. The program represented the combined efforts of Roy Downs, then Accident Prevention Specialist at the Baltimore FAA General Aviation District Office, and Vic Turner, a video-tape engineer for PBS's Baltimore outlet and also a pilot. The two men were convinced that if comprehensive, easy-to-understand weather information could be made available to pilots in the comfort of their own home—perhaps with some tips for safe flying thrown in—it would improve flight safety, particularly with regard to general aviation weather-related accidents.

Making the project a reality was easier said than done. A solid year of effort—planning, negotiation, fund-raising, and persuading—were spent before the program went on the air for the first time. One of the major obstacles, financing, was helped considerably by a grant from the Aircraft Owners and Pilots Association's Air Safety Foundation.

Turner was the first program host, as well as project coordinator, for what began as a 15-minute program, which included a segment on weather and a segment on pilot-education. Reaction from the beginning was favorable. Pilots agreed that one TV picture was, indeed, worth a thousand words. Color-coding of the nation's weather conditions—yellow for good VFR, grey-blue for marginal VFR, red for IFR—told them immediately where a VFR pilot could fly with no weather worries, where he *might* be able to go, although under less than ideal conditions, and where he could *not* go without instrument qualifications. Previous movement of the weather systems was related, as was the forecast future movement.

Everyone liked the ease and convenience of receiving a briefing at home, via television. There were no busy telephone signals to cope with, no uncertainty about what questions to ask to get a complete picture, no loss of time (or fuel) required to go out of one's way to talk face to face with a briefer. Here it was all given, and explained in a way that even a novice or student pilot could understand.

As word of the program got to pilots in other areas via the grapevine and through news media, the demand for televised weather spread. A number of stations in the eastern United States picked it up, and eventually arrangements were completed so that the program could be made available to all of the 239 public television stations in the country. More than 100 stations signed on before the first national broadcast on January 4th, and it seems likely that as the word gets around the list will grow. Government, industry and aircraft operators agree that televised weather is an eminently successful means of using mass communications to solve a difficult problem.

As the program, in 1972, outgrew Vic Turner's spare time, a new briefer was sought. FSS specialists were approached; several expressed interest; and finally Jan Allsman was chosen. In addition to his six years of FSS experience he is a commercial, instrument-rated pilot, so he is familiar with both sides of the briefer's desk. Before going to work at FAA he was assistant airport manager at Leesburg, Va. so he knows the aviation business from more than one viewpoint. His familiarity with both flying and weather is instantly apparent in his poised but lively performance on the screen.

In its present format the show is a 30-minute program. The first half presents solely weather information, first for the entire nation, then in a 2½-minute cutaway come reports by individual stations of weather in local areas. This is followed by a 15 minute segment on pilot education and safety information. Displays are mounted on rotating, internally lighted translucent cubes at either side of the set. Pale yellow maps of the country, with states outined, are permanent, and identical with those used on the facsimile maps which come out of the weather print-out machine. The colored overlays of clear acetate are taped in place for the

Alternate weatherman George Merriken, Jr. pinpoints highs, lows, "go's" and "no go's."

show.

As he points to the grey-blue marginal areas and the red IFR locations Jan classifies them even further by explaining what the ceilings and visibilities are. He may note that in one red area the pilot would need to be able to shoot an approach with a 400-foot ceiling to get in, while in another spot conditions are below minimums for even the most skilled instrument pilot.

The other maps are explained in turn. The radar overlay is exposed and the significant echoes pointed out. The stations marked "OS", Jan explains are out of service for maintenance, and he notes that whenever possible maintenance is performed during fair weather, when the need for radar information is less critical.

National Weather Service prognosis (forecast) charts for 12, 24, 36, and 48 hours, running through Sunday evening, are presented. These show general weather expectations as well as forecasts of the freezing level, icing conditions and turbulence. Winds aloft charts show the upper wind patterns at 5,000, 10,000, and 18,000 feet. The weather segment concludes with a 2½ minute cutaway for local weather reports, prerecorded within the hour by each outlet.

The pilot education presentation in the second segment of the show is usually via films. Subjects include such topics as density altitude, night flying, VOR navigation and any number of others. Presently the movies are mostly those made by FAA or AOPA, and edited to fit the available time slot. When these film libraries are exhausted, producer Alan Evans expects to replace them with original fifteen-minute segments designed specifically for the medium of television, but not necessarily restricted to film presentations. Material presented in FAA AVIATION NEWS will be one major source of material.

After the safety segment pilots are invited to write in for two publications, a Weather Service pamphlet, "The Pilot's Guide to Aviation Weather Services"; and an FAA paper, "The Pilot's Weather Briefing Guide," which tells which questions to ask to get a better briefing. The show closes with a reminder by Allsman that this weather information is for flight-*planning* purposes, and that pilots should always check current conditions before takeoff, and file a flight plan. "Remember," he adds, "a safe flight is no accident!"

Although the program proper uses up slightly less than half an hour, many, many hours go into the behind-the-scenes preparation. Included are the efforts of some 16 persons, in one capacity or another, including last minute, but painstaking, drawing of weather details on the map overlays by a team of specially trained artists. Jan supervises this operation, which must be finished so the maps are in place an hour before show time. The weather briefing is rehearsed, to eliminate any small bugs from the maps or script, and checked for timing.

Public reaction to the show has been very good. One viewer summed it up by writing "Jan is the kind of guy I always hope to find when I go into an FSS for a weather briefing." Another listener expressed appreciation for the program which helped him schedule his weekend flying lessons and saved him from a number of fruitless trips to the airport. A non-pilot viewer wrote, "It's the only weather show we really believe." The only complaints, so far, have been that the show is not on daily, longer, more frequent, or in more locations.

About half of the nation's 239 Public Television outlets (once called "educational TV") have signed on for Aviation Weather, which in the central and western states will be taped and shown at an appropriate time, generally about 7:00 p.m. It is almost certain that as word of the program's availability spreads, pilots everywhere will be pressuring their local stations to join the network for "Jan and the weather." ***RTB***

## PBS Stations Carrying "Aviation Weather"

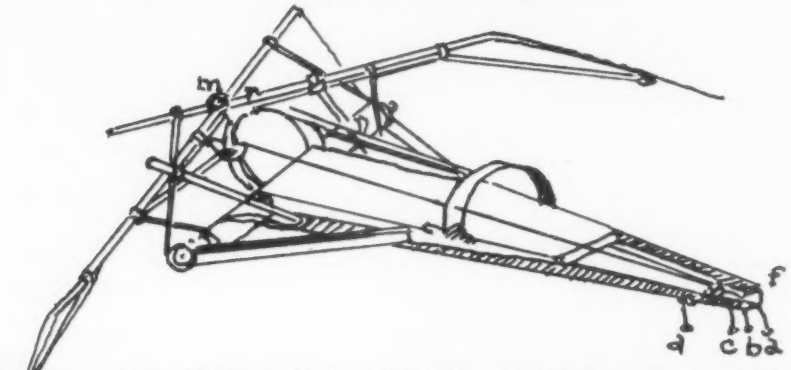
| State | Station(s) |
|---|---|
| Alabama | WBIQ, WIIQ, WDIQ, WFIQ, WHIQ, WGIQ, WEIQ, WAIQ, WCIQ |
| Arizona | KUAT, Tucson |
| California | KCET, Los Angeles<br>KVCR, San Bernardino<br>KPBS, San Diego<br>KTEH, San Jose<br>KCSM, San Mateo |
| Colorado | KRMA, Denver<br>KTSC, Pueblo |
| Connecticut | WEDH, Hartford<br>WEDW, WEDN |
| Delaware | WHYY, Wilmington |
| District of Columbia | WETA |
| Florida | WUFT, Gainesville<br>WJCT, Jacksonville<br>WMFE, Orlando<br>WSRE, Pensacola<br>WEDU, Tampa |
| Georgia | WCLD, Chatsworth<br>WACS, WABW, WUAN, WCES, WDCD, WJSP, WXGA |
| Idaho | KAID, Boise<br>KBGL, Pocatello |
| Illinois | WILL, Urbana<br>WSIU, Carbondale<br>WTIU, Bloomington |
| Indiana | WFYI, Indianapolis<br>WIPB, Muncie<br>WVUT, Vincennes |
| Kansas | KTWU, Topeka<br>KPTS, Wichita |
| Kentucky | WKPC, Louisville |
| Maryland | WMPB/WCPB |
| Massachusetts | WGBX, Boston |
| Michigan | WTVS, Detroit<br>WKAR, East Lansing<br>WCMU, Mount Pleasant |
| Minnesota | WDSE, Duluth |
| Mississippi | WMAA, Jackson<br>WMAB, WMAU, WMAO, WMAH, WMAV, WMAW |
| New Jersey | WNJS, WTLV, WNJT |
| New Mexico | KNME, Albuquerque |
| New York | WXXI, Rochester<br>WLIW, Garden City |
| North Carolina | WTVI, Charlotte |
| North Dakota | KFME, Fargo |
| Ohio | WOUB, Athens<br>WBGU, Bowling Green<br>WOSU & WPBO, Columbus<br>WGSF, Newark<br>WMUB, Oxford<br>WGTE, Toledo |
| Pennsylvania | WPSX, University Park<br>WITF, Hershey |
| South Carolina | WRLK, Columbia |
| South Dakota | KESD, Brookings |
| Tennessee | WSJK, Knoxville<br>WKNO, Memphis |
| Texas | KLRN, Austin<br>KUHT, Houston<br>KTXT, Lubbock<br>KNCT, Killeen |
| Vermont | WETK, WVTB, WVTA, WVER (Vermont Network) |
| Virginia | WCVE/WCVW, Richmond<br>WVPT, Harrisonburg<br>WBRA/WSUN, Roanoke/Norton |
| Washington | KWSU, Pullman<br>KSPS, Spokane |
| West Virginia | WMUL, Huntington<br>WWVU, Morgantown |
| Wisconsin | WHA, Madison |

Famous
**FLYERS**

Leonardo Da Vinci in a self-portrait etching. Two years before Columbus sailed to America, Leonardo created designs for mechanical flight as well as for the parachute.

# LEONARDO DA VINCI

## *The First Aerospace Engineer*




The tiny Tuscan town of Vinci, Italy, is known as the birthplace of the artistic genius, Leonardo, painter of such masterpieces as *The Last Supper*, and the *Mona Lisa*, which have inspired great heights of human emotion. But Leonardo of Vinci was also haunted by a dream of human beings physically soaring up to Heaven, and he devoted many hours and efforts of his fertile mind to the problem of adapting man to birdlike flight. It is a dream which has persisted over dozens of centuries (a prize of 10,000 British pounds is currently offered for the first controlled man powered flight). Leonardo, for all his genius, failed to achieve a design that could get a man off the ground, but the brilliance of his investigations was such that his 15th century sketches pointed the way to eventual development of the parachute and the helicopter, if not the airplane itself.

Born in 1452, the son of an artisan, Leonardo received little formal education, a disadvantage he later sought to overcome by means of his voracious appetite for learning. At age 16 he was apprenticed to Master Verrochio of Florence, a noted goldsmith and sculptor and typical Renaissance seeker of truth. Encouraged by Verrochio, Leonardo mastered not only the arts (including music) but all the known physical sciences as well, including mathematics, biology, astronomy, and physics. By the time he was 21, he had the skilled, expressive hands of an artist and the mind of a scientist/philosopher. Whatever interested him he pinned down on his drawing board, in the form of a sketch or a detailed drawing. His painting brought him early fame, since art was a premier commodity in Renaissance Europe, but the exploration of the physical world remained his passionate interest and his boyhood fascination with the flight of birds never left him.

As a biologist who had dissected many birds, as well as human remains, Leonardo recognized that proportionally man does not have as much muscular power available for wingpower as do birds, but so fervent was his desire to succeed in this field that he persuaded himself it was merely a problem of supplying adequate mechanical linkage and leverage for a human flying machine. With painstaking care and precise draftmanship he calculated the center of gravity of various birds, and he worked out weight/lift ratios and the wing area necessary to support the average man, as well as the leg and arm power required to move the wings in a birdlike manner.

His early designs, beginning in 1486, looked like a surfboard to which the prone aviator was fastened by means of an iron girdle. Wings were operated (a downward and rearward beat) by means of stirrups, with the right foot lowering the wings and the left foot raising them. Later he introduced hand cranks to help the wing elevation and added a rudder attached to a hoop around the pilot's head (a device later used until the time of the Wright brothers first powered flight).

A designer, not a builder, Leonardo cautioned any ambitious craftsman that . . . "this machine should be tried over a lake, and you should carry along a wineskin, so that in case you fall, you will not be drowned." Thus was proposed the first form of survival gear for pilots, and a very practical idea, considering the weight of his

flying machine.

Leonardo later designed a boat-shaped ornithopter, using oars to move the wings; a pedal-powered machine; and various other combinations of hand and leg power, with spring devices to assist in the recovery stroke. He also became interested in the helical wheel as a form of airscrew and in 1486 to 1490 sketched model designs for a vertical lift machine which appears to be the earliest suggestion for a helicopter. Incidentally, he used the same principle of the helix to suggest a means of harnessing the movement of heated air as a source of power to continuously turn a roasting spit—actually a very practical design.

There is no evidence, however, that any of Leonardo's aeronautical designs were ever built, let alone put to the test. Whether this is because their impracticality—in terms of excessive weight and inadequate power—was apparent to the inventor, or whether he tested some models in secret without success, or whether there were other reasons why experimentation never took place, it is difficult to know. It is known that in 1503 Leonardo became aware of a well publicized experiment with a glider type of flying machine built by one Giovanni Battista Danti, a mathematician. As part of the festivities of an important wedding in Perugia, Danti launched himself in the glider from the spire of a local church. For a moment he hovered in the air, then his machine caught on a projection and crashed, leaving its inventor with a broken leg.

Consequently, Leonardo's last phase of aeronautical design centered upon a glider which he apparently hoped to launch from a hilltop in Fiesole, 1300 feet above Florence. A reference in his notebook in 1505 indicates that he hoped to win "eternal glory" with this flight, but there are no records of it ever having been made or attempted. When the great genius died in 1519, his will conveyed all of his notes and sketches to his close friend, Francesco de Melzi, who kept them away from prying eyes for 50 years. Later his son made the horde available to the public, but it was not until well into the 18th century that Leonardo's influence on the development of aviation was broadly experienced.

Perhaps, as one of his friends said of Leonardo after his death, as a birdman he was a magnificent painter. His determined efforts to design a successful ornithopter may, in fact, have sidetracked later experimenters who continued to experiment with flapping wings down until the 20th century. But there is no question that Leonardo was the first to set the pattern for a scientific investigation of air as a medium of transportation, and for the anatomical study of birds in determining the principles of aerodynamics. His confidence in the ability of man to do all that he dared was, no doubt, a continuing source of inspiration to all who have worked in aviation. ■

## Pilot BRIEFS

■ IN-FLIGHT TIRE DEFLATION caused more than $7,000 damage to a single-engine aircraft when it went out of control during landing. Subsequent investigation determined that the plane had been delivered from the factory with tubeless tires, but tubes were installed because of a problem in maintaining tire pressure. A line-man, unaware of this, inflated the tires with the standard inflation needle made for tubeless tires. (Valve stems were hidden by the wheel fairings.) After takeoff, the punctured inner tubes slowly deflated. Aircraft owners who have added tubes to tubeless tires are cautioned to oversee the tire-inflation operation personally, or placard the fairings.

■ SHARE YOUR EXPERIENCES. In the belief that lessons learned through personal experiences provide the best education, FAA's Safety Data Branch at Oklahoma City is seeking pilot cooperation in bringing to light maintenance or operating problems with aircraft. If an aircraft or a part does not work the way the manual says it should, "write it up."Any experience that has helped you may help others—so why not share it? Mail to FAA Aeronautical Center, AAC-236, P.O. Box 25082, Oklahoma City, Ok. 73125. No special form required.

■ MESSAGE FROM THE OIL FILTER. A used oil filter can tell you a lot if you take the time to examine it closely. Cut the paper media from the end caps, remove the pleated paper from the center tube and take a close look for foreign material. If large amounts of metal are apparent on any oil change it is an indication of trouble and should be investigated thoroughly. In new or newly overhauled engines some minute particles of metal may be found. This is normal during the break-in period, but if it persists after the break-in period is completed, it should be checked by a mechanic. If, as is usually the case, you find nothing, you will have peace of mind.

■ BAG-TAG FALLOUT. All airmen can profit from the experience of airmail pilots who have found that pieces of metal mailbag seals, which occasionally fall apart in the airplane, are small enough to fall through cracks or openings in the floor of the aircraft, where they could become entangled in cables, pulleys, bellcranks, etc. of the aircraft control system. It is suggested that the floor areas used to haul mail or other items be inspected and sealed where practical with cloth-backed industrial or duct tape.

■ PILOT FLIGHT AND GROUND SCHOOLS certificated by FAA as of June 30, 1973, are included in an updated FAA publication which lists schools by name, address, certificate number and ratings and special courses authorized. Copies of AC 140-2G, "List of Certificated Pilot Flight and Ground Schools" are available free from DOT/FAA Distribution Unit, TAD 484.3, Washington, D.C. 20591.

**AROUND THE WORLD IN 170 DAYS.** The first aerial circumnavigation of the globe was accomplished in 1924 by four Douglas **Cloudster** airplanes beginning and ending at Santa Monica Airport, then Clover Field. The airport celebrated its 50th anniversary recently.

# FAA Announces Seven-Point Jet Fuel Conservation Plan

A seven-point plan to reduce jet fuel consumption in the growing energy crisis has been announced by FAA. The seven actions are short-term measures which can be taken quickly for an estimated fuel saving of more than 20,000 barrels a day (840,000 gallons). This amounts to 2.7 percent of the daily jet fuel consumption in the U.S. The new policy will:

- Revise air carrier gate hold procedures to reduce time spent with engines running before takeoff at the runway;
- Encourage more use of optimum aircraft cruising speeds;
- Revise air traffic flow procedures;
- Advise controllers to hold aircraft at high altitudes and assign optimum altitudes for more efficient fuel burning and to minimize circuitous routings;
- Recommend taxiing aircraft with fewer engines running;
- Increase use of aircraft simulators for training and check flights;
- Encourage airport sponsors to speed construction of runway and taxiway improvements.

Air traffic controllers and supervisors from across the country met in Washington recently to review methods of reducing arrival delays. Airborne holding will be minimized by managing traffic so as to absorb delays prior to departure, thus reducing excessive airborne delays due to weather conditions or traffic backups at the terminal airport.

## Instructor Test Guide Up-dated

FAA's written test guide for ground instructors has been revised. The guide describes knowledge requirements, identifies source material that can be used, and includes a sample test with answers and explanations. The new booklet replaces the "Ground Instructor Examination Guide, AC 143-1B" issued in 1967.

Copies of "Ground Instructor Written Test Guide, Basic-Advanced, AC 143-1C," are available from GPO Bookstores for $1 or by mail from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for $1.25.

## Civil Aircraft Registrations Drop

The total number of civil aircraft on FAA files has dropped by some 24,000 since FAA began requiring annual validation of all aircraft registrations, in 1970. Prior to 1970 all registered aircraft were carried on FAA files until the owners requested that they be de-registered. Now owners must verify registration each year or the registration certificate is revoked, and the aircraft automatically dropped from the official count.

The latest figures, which cover both 1970 and 1971, show a total of 166,785 civil aircraft in the U.S. at the end of 1971, of which 133,870 were listed as "active" aircraft. This compares with 190,749 total aircraft at the end of 1969, of which 133,814 were listed as "eligible" to fly.

## Federal Publications Prices Rise

New, higher rates for all government publications have been announced by the Government Printing Office. Effective January 1, the annual domestic subscription rate for FAA AVIATION NEWS is $4.90.

Although FAA produces the safety magazine for pilots, subscription rates and conditions of sale are determined by the Superintendent of Documents, U.S. Government Printing Office. Price increase is attributed to new postal rates for 1974, as well as rising printing, labor and paper costs.

Subscribers who have problems with subscriptions should contact Superintendent of Documents, Customers Service Section, GPO, P. O. Box 1533, Washington, D.C. 20013. Telephone: (202) 541-3735.

## First Group II TCAs Go Into Effect

The first two Group II terminal control areas (TCAs) go into effect this month—at St. Louis on January 1, and at Seattle on January 31. A total of twelve Group II TCAs have been proposed. The ninth and last of the proposed Group I TCAs also becomes effective in January at the Dallas/Fort Worth Airport.

To operate within a Group II TCA, pilots need two-way radio, and VOR or TACAN receivers. Transponders (required for all traffic in Group I TCAs) are not presently required for VFR traffic in Group II TCAs, but are needed for IFR flight.

Diagrams of both Group I and Group II TCAs may be found in Part 4 of the Airman's Information Manual, and can be purchased as local charts at the usual retail outlets.

## Maintenance Symposium Draws 750

Nearly 150 representatives of 40 foreign countries, including Czechoslovakia, Romania and Yugoslavia, were among the 750 registrants at the Ninth Annual FAA International Aviation Maintenance Symposium at the Shoreham Hotel in Washington, D.C. in December. Theme of the program was "Managing for Airworthiness and Reliability". A total of nearly 6,000 persons have taken part in the nine meetings to date, hosted by the Maintenance Division of FAA Flight Standards Service.

During the three days of the symposium experts from all facets of aviation industry and government exchanged ideas and answered questions on maintenance techniques and new developments in the servicing of all types of aircraft, from the tiniest homebuilt sport plane to the largest of jumbo jets. A discussion of the new trends indicated for aviation maintenance will be reported in a coming issue.

### ELT DEADLINE EXTENDED

The deadline for carrying an emergency locator beacon (ELT) on most types of general aviation aircraft has been extended from December 30, 1973 to June 30, 1974. As amended, the Federal Aviation Regulations will also exempt these types of flights from any ELT requirement (in addition to those already exempted):

- Training flights within 50 miles.
- Design and testing flights.
- Deliveries of new aircraft.
- R and D aircraft.
- Aircraft used for crew training, exhibition, racing, market surveys or for showing compliance with FARs.
- Aircraft limited to one occupant.

The regulation does not apply to foreign aircraft, military planes and rotorcraft. Ag planes and all turbojets were previously exempted.

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

## • Simulator Training

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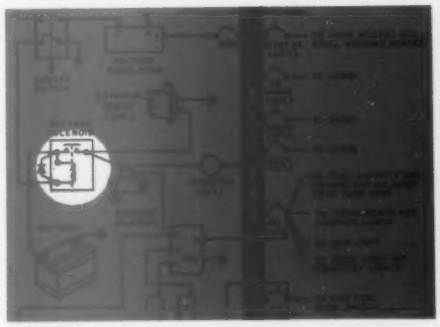

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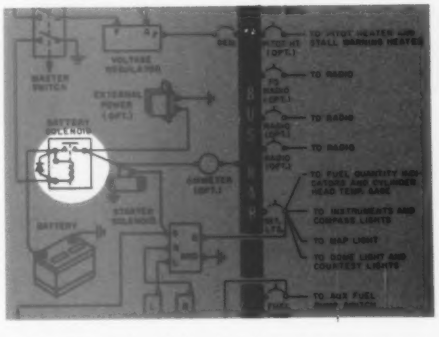


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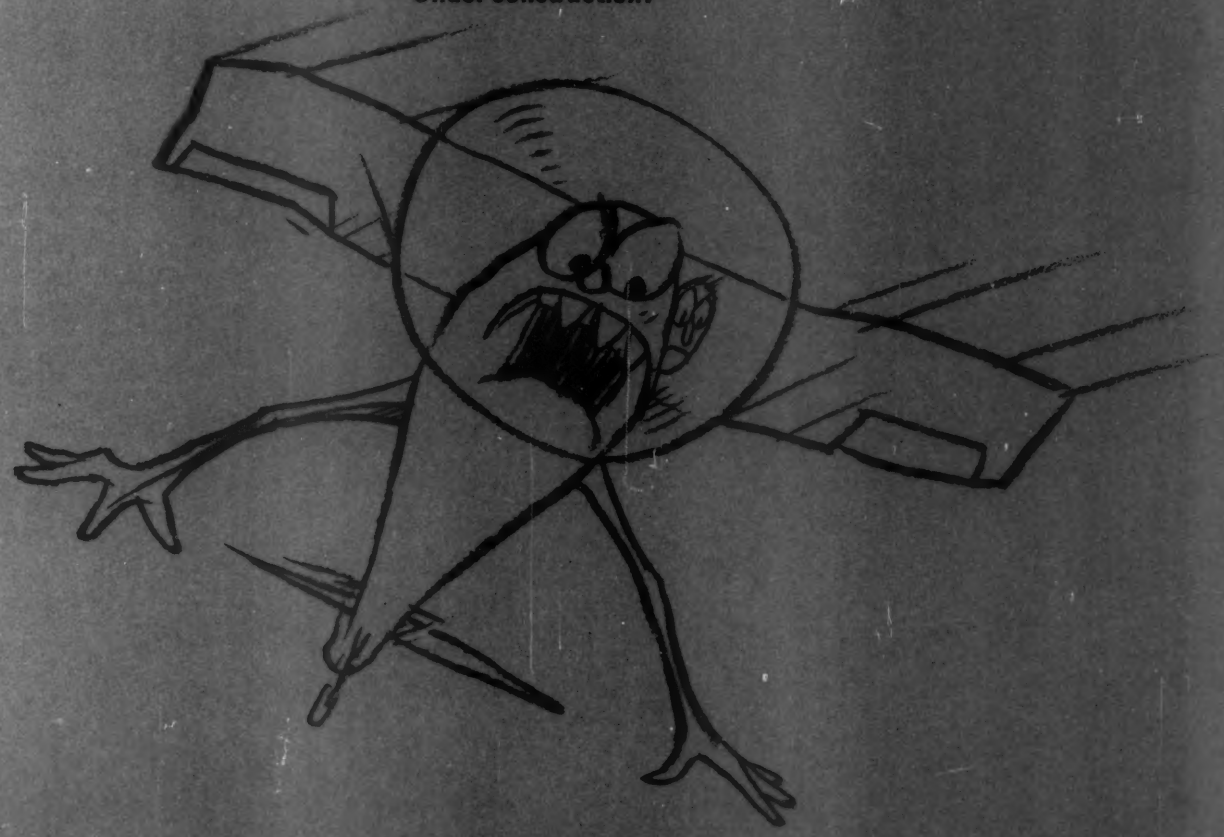

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Expect obstruction!

Suggested by Cliff Carnick
FAA Public Affairs, Northwest Region